The Relation of Maternal Factors to the Severity of Hyperemesis Gravidarum

Original Article

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ABSTRACT

Objective: To assess the relation of maternal factors to the severity of hyperemesis gravidarum.
Study design: Cross-sectional study.
Setting: Mansoura University Hospitals.
Patients and Methods: 120 pregnant women with an intrauterine viable singleton pregnancy of less than 16 weeks' gestation complaining of vomiting with pregnancy.
Results: 33 (65.34%) patients were primigravida, 36 (30%) patients were nullipara, 33 (27.5%) patients were primipara,, 48 (40%) patients had BMI <18 , 31 (25.83%) patients had past history of hyperemesis gravidarum , 24 (20%) patients had dysmenorrhea, 16 (13.33%) patients had family history of HG. These maternal factors were significantly higher in Severe HG group than moderate HG group (*P value*<0.05). 20 patients (16.67%) patients were passive smokers and it was insignificantly different between severe and moderate groups. Hospital stay ranged from 7 to 14 days with a mean value 9.09 ±2.13 days in severe group and ranged from 2 to 5 days with a mean value 3.14 ±1.14 days in moderate group. Hospital stay was significantly prolonged in severe group than moderate group (*P value*<0.05). Termination of pregnancy occurred in 1 (3.13%) patient in severe group and in 0(0%) patients in moderate group. Termination of pregnancy was insignificantly different between both groups (*P value*>0.05).
Conclusions: Frequency of vomiting and PUQE score were significantly higher in age group (16-25 y), BMI group (<18), parity (0 and 1), in patients with past history of HG , dysmenorrhea and family history of HG (*P value* <0.05). ketonuria was significantly higher in age group (16-25 y), BMI group (<18), parity (0 and 1) and in patients with past history of HG (*P value* <0.05). Ketonuria was insignificantly different in patients with passive smoking.

Key Words: Age, hyperemesis gravidarum severity, maternal factors, parity.

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INTRODUCTION

Hyperemesis gravidarum was defined as uncontrollable vomiting throughout the day, without regard to food, without improving with treatment, and affecting overall health, starting in the first trimester, and accompanied by the triad of electrolyte imbalance, dehydration, and five percent loss of pre-pregnancy weight without any other known underlying pathological reason for vomiting[1-3].

The following are included in the RCOG Green Top Guidelines for the diagnosis of HG: Requirements include beginning in the first trimester, ongoing nausea and/or vomiting, and the absence of any known reasons. Other requirements include electrolyte imbalance, dehydration, and weight loss of more than 5%[4].

Three components make up the Pregnancy-Unique Quantification of Emesis and Nausea (PUQE Score), a scoring system for nausea and vomiting in pregnancy: (Q1) How long do you often feel queasy in a day? (Q2) How often do you throw up or vomit on average during the day? (Q3) How many times a day, on average, have you experienced dry heaves or retching?.. Every question was given a score between 1 and 5, and the PUQE total was equal to 15. Pregnancy-related mild nausea and vomiting (NVP ≤ 6, moderate NVP 7–12, and severe NVP ≥ 13)[1].

It is uncertain what causes HG, however it is probably complex[5]. The development of HG is associated with elevated levels of placental growth hormone, adrenocortical hormones, estrogen, progesterone, leptin, prolactin, thyroxine, and human chorionic gonadotropin (hCG) in the blood[6].

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Goodwin *et al*., (1992) reported that women with HG had lower serum TSH values more frequently, compared to typical pregnant women[7-9].

More recently, a number of studies have revealed that 94% of women with hyperemesis have no history of mental illness. While they may experience anxiety or depression during pregnancy if they are too ill to take care of their families or eat healthily, these symptoms will eventually go away and their severe physical symptoms will stop. Furthermore, Helicobacter pylori infections and/or excessively elevated levels of the pregnancy hormone hCG are common in women who have no nausea throughout pregnancy or very mild nausea[10-12].

An increased risk of developing or exacerbating hyperemesis gravidarum can be linked to a number of factors, such as a prior history of the condition, a family history of severe nausea/vomiting during pregnancy, a younger maternal age, low body weight, dysmenorrhea, nulliparity, multiple pregnancies, first pregnancies, allergies, and a restrictive diet[13].

The relationship between maternal variables and the severity of hyperemesis gravidarum has not been well studied. Our goal is to determine how maternal characteristics, the severity of HG, and the PUQE Score, ketonuria, and hospital stay in Egyptian women relate to one another.

MATERIALS AND METHODS

Patient population

Between March 2022 and March 2023, 120 pregnant patients with an intrauterine viable singleton pregnancy of less than 16 weeks' gestation were admitted to the Department of Obstetrics and Gynecology at Mansoura University Hospital. A cross-sectional research was carried out on these patients. The Institutional Research Board of the Mansoura Faculty of Medicine examined and approved the study protocol (code number: MS.21.02.1387).

In this study, patients who complained of vomiting during pregnancy and had a viable intrauterine singleton pregnancy of fewer than 16 weeks' gestation were included. Interviews, information on the study, and participation counseling were given to qualified individuals. All women involved in the research gave their written informed permission. The following conditions precluded patients from participating in the study: molar pregnancy; renal failure; liver failure; diabetic ketoacidosis; food poisoning; labyrinthitis; Meniere's disease; cholecystitis; pancreatitis; hepatitis; and a history of eating disorders.

Methods

All patients were subjected to:

History taking: the history of a patient should include:

- Personal history: name ,age, residency, duration of marriage and smoking status.
- Obstetric history: gravidity and parity.
- Menstrual history: dysmenorrhea.
- A history of hyperemesis gravidarum during antenatal care.
- Family history of hyperemesis gravidarum .
- Past history of medical diseases causing vomiting as cholecystitis, pancreatitis, hepatitis and pre-existing eating disorder.
- PUQE scoring questionnaire (1) : is performed on admission, for follow up and on discharge. The patient is discharged after improvement or on demand.

Physical examination

- Vital indicators include blood pressure, temperature, and pulse.
- Patient weight: Body weight (in kilograms) divided by height (in meters squared) is the Body Mass Index (BMI)[14].

Obstetric ultrasound (LOGIQ F6 GE Medical China): to detect viable singleton intrauterine pregnancy less than 16 weeks gestation and to rule out multiple gestation and molar pregnancy.

Investigations: In order to rule out other possible explanations of the presenting symptoms, a thorough assessment is the cornerstone of the clinical work up for patients with hyperemesis gravidarum. The first evaluation often includes the following laboratory tests:

- Urine analysis to check for ketonuria, albuminuria and specific gravity .
- CBC: elevation of hematocrit may be due to hemoconcentration and dehydration.
- Serum electrolytes (Na, K, Ca, Mg)

- Reduced oral fluid intake and frequent episodes of vomiting may have an impact on arterial blood gases (ABG).

- Liver function tests, kidney function tests.

Management

A standard regimen for management of hyperemesis gravidarum adopted by local guideline protocol in Mansoura university hospital was applied for all the study participants. It consisted of administration of intravenous crystalloid solutions and correction of any electrolyte imbalance. Keeping the patient on nil per oral (NPO) for the first 24 hours and administering medicines as part of routine standard practice[15]:

First line therapy: as

- Vomibreak 10 mg, doxylamine-pyridoxine © MARCYRL.
- Emetrex 20mg, cyclizine © AMOUN PHARM.

Second line therapy: as

- Danset 4-8 mg, ondansetron © ADWIA.
- Primperan 10 mg, metoclopramide © SANOFI.
- Granitryl 1mg, granisetron © EGYPHARMA.

Third line therapy: as

- Hydrocortisone 100 mg, corticosteroid © ROTEX MEDICA.

To record information on age, parity, dysmenorrhea, smoking status, and body mass index (BMI), a structured interviewing sheet was created. The PUQE scoring questionnaire was employed to evaluate the degree of HG. Patients with response to therapy were discharged. Patients who show persistent vomiting despite therapy were kept hospitalized and was managed as appropriate.

Sample size calculation and power analysis

Was based on the prevalence of hyperemesis gravidrum during pregnancy retrieved from previous research (London *et al*., 2017)[5]. The overall sample size was 113 pregnant females, based on an 8–10% prevalence rate, 95% confidence interval, and allowable margin of error of 5. This was calculated using Epi Info version 7.2.4.0.

Statistical analysis

IBM Inc., Chicago, IL, USA used SPSS v26 for statistical analysis. Using the unpaired Student's t-test, quantitative variables were compared between the two groups and provided as mean and standard deviation (SD). The Mann Whitney test was used to evaluate quantitative non-parametric data, which were reported as the median and interquartile range (IQR). When applicable, the Fisher's exact test or the Chi-square test were used to examine the frequency and percentage (%) of the qualitative variables. A statistically significant result was defined as a two-tailed *P value* less than 0.05.

RESULTS

A total of 143 patients had their eligibility for participation in the research evaluated, as can be seen in the study flowchart (Figure 1). Seven patients declined to take part in the trial, while sixteen patients did not match the inclusion criteria. There were 120 patients taking part in the research (Figure 2).

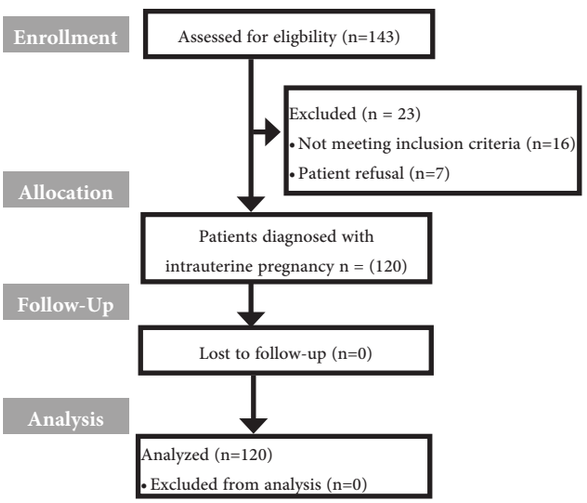
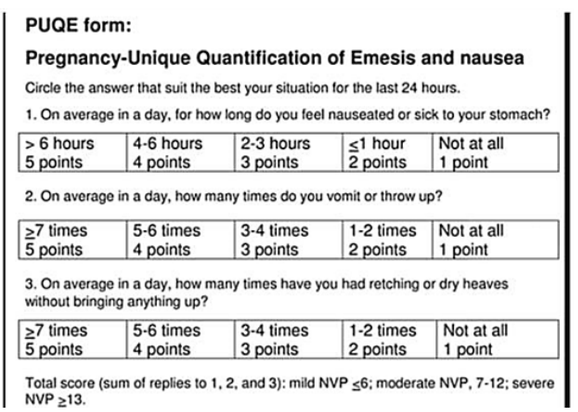


Fig. 1: Study flow diagram



PUQE form:

Pregnancy-Unique Quantification of Emesis and nausea

Circle the answer that suit the best your situation for the last 24 hours.

1. On average in a day, for how long do you feel nauseated or sick to your stomach?

> 6 hours 5 points	4-6 hours 4 points	2-3 hours 3 points	≤1 hour 2 points	Not at all 1 point

2. On average in a day, how many times do you vomit or throw up?

≥7 times 5 points	5-6 times 4 points	3-4 times 3 points	1-2 times 2 points	Not at all 1 point

3. On average in a day, how many times have you had retching or dry heaves without bringing anything up?

≥7 times 5 points	5-6 times 4 points	3-4 times 3 points	1-2 times 2 points	Not at all 1 point

Total score (sum of replies to 1, 2, and 3): mild NVP ≤6; moderate NVP, 7-12; severe NVP ≥13.

Fig. 2: Pregnancy unique quantification of Emesis & nausea

The age ranged from 16 to 38 years with a mean value 25.3 ± 4.8 years. 48 (40%) patients had BMI <18, 42 (35%) patients had BMI 18-25, 30 (25%) patients had BMI 25-30. 36 (30%) patients were nullipara, 33 (27.5%) patients were primipara, 41 (34.17%) patients were second-para, 3 (2.5%) patients were third-para and 7 (5.83%) patients

were fourth-para. Regarding smoking 20 (16.67%) patients were passive smokers. 31 (25.83%) patients had past history of HG. 24 (20%) patients had dysmenorrhea. 16 (13.33%) patients had Family history of HG. Vomiting frequency varied from 3 to 9 times, with a mean of 4.8 ±1.87. (Table 1)

Table 1: Demographic data and history of the studied patients

		N=120
Age (years)		25.3 ± 4.8
BMI (kg/m^2)	<18	48 (40%)
	18-25	42 (35%)
	25-30	30 (25%)
Gravidity	1	33 (27.5%)
	2	29 (24.17%)
	3	31 (25.83%)
	4	14 (11.67%)
	≥ 5	13 (10.83%)
Parity	0	36 (30%)
	1	33 (27.5%)
	2	41 (34.17%)
	3	3 (2.5%)
	4	7 (5.83%)
Passive Smoking		20 (16.67%)
Past history of HG		31 (25.83%)
Dysmenorrhea		24 (20%)
Family history of HG		16 (13.33%)

Data are presented as mean ± SD, number (%) or median. BMI: body mass index. HG: hyperemesis gravidarum

Regarding PUQE scoring questionnaire, 88 (73.33%) patients had moderate vomiting with pregnancy, and 32 (26.67%) patients had severe vomiting with pregnancy. Ketonuria was negative in 1 (0.83%) patient, +1 in 35 (29.17%) patients, +2 in 46 (38.33%) patients, +3 in 30 (25%) patients and +4 in 8 (6.67%) patients (Table 2)

Table 2: Hospital admission of the studied patients

		N=120
Frequency of vomiting (times/day)		4.8 ± 1.87
PUQE scoring	Moderate (7-12)	88 (73.33%)
	Severe (≥ 13)	32 (26.67%)
Ketonuria	Negative	1 (0.83%)
	+1	35 (29.17%)
	+2	46 (38.33%)
	+3	30 (25%)
	+4	8 (6.67%)

Data are presented as number (%). PUQE: Pregnancy-Unique Quantification of Emesis.

The serum creatinine of the studied patients ranged from 0.5 to 0.9 mg/dl with a mean value 0.7 ± 0.14 mg/dl. SGPT ranged from 14 to 514 U/L with a mean value 46.2 ± 55.99 U/L. SGOT ranged from 16 to 184 U/L with a mean value 36 ± 23.03 U/L. HCO3 ranged from 12 to 28 mEq/L with a mean value 18.68 ±3.32 mEq/L. PaCO2 ranged from 18 to 41.5 mmHg with a mean value 32.2 ±7.33 mmHg. pH ranged from 7.25 to 7.51 with a mean value of 7.37 ±0.06 (Table 3)

Table 3: Laboratory investigations of the studied patients

	N=120
Serum creatinine (mg/dl)	0.7 ± 0.14
SGPT (U/L)	46.2 ± 55.99
SGOT (U/L)	36 ± 23.03
HCO_3 (mEq/L)	18.7 ± 3.32
$PaCO_2$ (mmHg)	32.2 ± 7.33
pH	7.4 ± 0.06

Data are presented as mean ± SD or number (%). SGPT: serum glutamic pyruvic transaminase, SGOT: serum glutamic-oxaloacetic transaminase.

In severe group patients, frequency of vomiting and PUQE score were significantly higher in age group (16-25 y), BMI group (<18), parity (0 and 1), in patients with history of HG in previous pregnancy, dysmenorrhea and family history of HG (P value <0.05). Frequency of vomiting and PUQE score were insignificantly different in patients with passive smoking. ketonuria was significantly higher in age group (16-25 y) , BMI group (<18), parity (0 and 1) and in patients with history of HG in previous pregnancy (*P value* <0.05). Ketonuria was insignificantly different in patients with passive smoking and family history of HG. Hospital stay was insignificantly different between different age groups, BMI groups, parity, passive smoking, history of HG in previous pregnancy, dysmenorrhea and family history of HG (Table 4).

Frequency of vomiting / day: ranged from 6 to 9 times with a mean value 7.22±0.91 times in severe group and ranged from 3 to 8 times with a mean value 3.93 ±1.26 times in moderate group. Hospital stay ranged from 7 to 14 days with a mean value 9.09 ±2.13 days in severe group and ranged from 2 to 5 days with a mean value 3.14 ±1.14 days in moderate group. The severe group experienced considerably more episodes of vomiting per day and ketonuria than the moderate group, and their hospital stay was also much longer (*P value*<0.05). Termination of pregnancy occurred in 1 (3.13%) patient in severe group and in 0(0%) patients in moderate group. Pregnancy termination did not differ substantially between the two groups (*P-value*>0.05). (Table 5)

Table 4: Relation between maternal factors and hospital admission criteria in (severe group patients)

		Frequency of vomiting	PUQE score	Ketonuria	Hospital stay
Age (years)	16-25 y	8.3 ± 0.9	14.4 ± 0.71	3.3 ± 0.46	9.2 ± 2.25
	26-30 y	7.4 ± 0.89	13.6 ± 0.55	3 ± 0	8.8 ± 1.79
	>30 y	7 ± 1.41	13.5 ± 0.71	3 ± 0	8.5 ± 2.12
P value		0.006*	<0.001*	<0.001*	0.493
BMI (kg/m^2)	<18	7.96 ± 1.22	14.48 ± 0.75	3.7 ± 0.47	9.11 ± 2.19
	18-25	6.2 ± 0.45	13.4 ± 0.55	3.2 ± 0.45	9 ± 2
P value		0.004*	0.005*	0.033*	0.917
Parity	0	7.5 ± 1.15	14.4 ± 0.81	3.5 ± 0.52	9.1 ± 2.14
	1	7.4 ± 0.74	13.6 ± 0.84	3.3 ± 0.47	9.3 ± 2.27
	2	6 ± 0	13 ± 0	3 ± 0	8 ± 1.41
P value		<0.001*	<0.001*	0.002*	0.163
Passive smoking	Yes	8.5 ± 0.71	14 ± 1.41	3 ± 0	9 ± 1.41
	No	7.2 ± 0.89	13.87 ± 0.82	3.23 ± 0.43	9.1 ± 2.19
P value		0.052	0.831	0.456	0.950
Past History of HG	Yes	7.67 ± 0.72	14.2 ± 0.86	3.4 ± 0.51	9.27 ± 2.19
	No	6.82 ± 0.81	13.53 ± 0.72	3.06 ± 0.24	8.94 ± 2.14
P value		0.004*	0.023*	0.019*	0.673
Dysmenorrhea	Yes	7.71 ± 0.99	14.18 ± 0.88	3.35 ± 0.49	8.71 ± 1.76
	No	6.93 ± 1.03	13.47 ± 0.74	3.07 ± 0.26	9.53 ± 2.47
P value		0.039*	0.021*	0.053	0.280
Family history of HG	Yes	7.83 ± 1.27	14.33 ± 0.89	3.08 ± 0.29	9.17 ± 2.25
	No	6.8 ± 0.83	13.5 ± 0.76	3.35 ± 0.49	9.05 ± 2.11
P value		0.009*	0.008*	0.097	0.884

Data are presented as mean ± SD. PUQE: Pregnancy-Unique Quantification of Emesis. BMI: body mass index. *: Significant, *P* <0.05 HG: hyperemesis gravidarum.

Table 5: Comparison between moderate and severe group as regard frequency of vomiting, ketonuria, hospital stay and TOP

		Moderate group (n=88)	Severe group (n=32)	*P value*
Frequency of Vomiting	Range	3 – 8	6 – 9	<0.001*
	Mean ± SD	3.93 ± 1.26	7.22 ± 0.91	
Ketonuria	Negative	1 (1.14%)	0 (0%)	0.544
	+1	35 (39.77%)	0 (0%)	< 0.001*
	+2	46 (52.27%)	0 (0%)	< 0.001*
	+3	5 (5.68%)	25 (78.13%)	< 0.001*
	+4	1 (1.14%)	7 (21.88%)	0.003*
Hospital stay	Range	2 – 5	7 – 14	<0.001*
	Mean ± SD	3.14 ± 1.14	9.09 ± 2.13	
**TOP	Yes	0 (0%)	1 (3.13%)	0.266

*Significant as *P value*≤0.05 **TOP: Termination of pregnancy

DISCUSSION

Ketonuria, hospital stay, and the pregnancy unique quantification of emesis and nausea (PUQE) score index can all be used to determine the severity level of hyperemesis gravidarum.

In the current study, regarding PUQE scoring questionnaire, 88 (73.33%) patients had moderate HG and 32 (26.67%) patients had severe HG. This is consistent with Chhetry *et al*., (2016) who found that most cases were moderate to severe HG with a mean PUQE score of 12.29 ± 1.59[16].

Kim *et al*.,(2020) evaluated the pre-pregnancy risk variables for HG-related hospital stays. According to their findings, 1.0% was the estimated prevalence of hospital stays. Increased usage of antiemetic medications and changes in maternal characteristics, such as an increase in births by older women with lower estrogen levels than younger women, were the causes of this decreasing incidence[8].

In the current study, past history of HG was present in 31 (25.83%) patients. In a comparison between the severe and moderate groups, The severe group had a considerably greater history of HG in their prior pregnancy compared to the moderate group (*P-value*<0.001).

The gravidity of the severe group in the current research was considerably lower than that of the moderate group ($P = 0.002$). The severe group had a considerably greater parity (0 and 1) than the moderate group (P=0.007 and 0.029, respectively). Nurmi *et al*.,(2020) stated that when gravidity and parity grew, the risk of HG dramatically decreased. They came to the conclusion that in later pregnancies, the metabolic responses causing HG could be lessened. Therefore, it may be said that as parity rises, HG incidence falls[17].

Fiaschi *et al*.,(2016) reported that Even when other maternal factors were taken into account, nulliparous women were still more likely to be admitted for HG than parous women[18].

There have been conflicting findings on the relationship between gravidity and parity. While some studies have linked higher gravidity to an increased risk of HG, others have suggested that primiparous women are not at as high of a risk. Our findings conflict with those of Nurmi *et al*. (2020), who discovered that compared to women who had never been diagnosed with HG, a greater pregnancy risk was associated with HG[17].

Nurfadillah *et al*.,(2023) found that primigravida pregnant women (55 patients 45.8%) comparing to the control group (34 patients 28.3%) were up to 2.14 times more dangerous than multigravida pregnant ladies. (65 patients 54.2 %) comparing to the control group(86 patients 71.7%)[19].

In the current study, 48 (40%) patients had BMI <18, 42 (35%) patients had BMI 18-25 and 30 (25%) patients had BMI 25-30. In a comparison between the severe and moderate groups, BMI (<18), was considerably greater in the severe group compared to the moderate group (*P-value*<0.05). This agrees with Kim *et al*.,(2020) who found that patients with low BMI was associated with hospitalization due to HG[8].

Thakur *et al*.,(2019) found that 16 (63.63%) low BMI patients had more severe hyperemesis gravidarum and 12 (42.85%) high BMI patient had moderate hyperemesis gravidarum[20].

In comparison to women with ideal BMI (58 patients, 48.3%) and the control group (81 cases, 67.5%), Nurfadillah *et al*.,(2023) found that women with non-ideal BMI (62 patients, 51.7%) and the control group (39 cases, 32.5%) were at higher risk of exposure to HG 2.22 times. This difference can be explained by the possibility that less fat deposits may not be able to neutralize circulating placental factors that cause HG. Additionally, women who weigh less have decreased estrogen levels, which might be the reason why they get HG[19].

In the current study, 24 (20%) of patients had dysmenorrhea. In a comparison between the severe and moderate groups, dysmenorrhea was significantly higher in Severe group than moderate group (*P value*<0.05). According to Thakur et al. (2019), 22.91% (29) of the women did not have dysmenorrhea, whereas 77.08 percent (111) of the women did. Dysmenorrhea may thus be a risk factor for HG[20]. Enakpene *et al*., (2015) explained that by the possible underlying hormonal sensitivity or imbalance. Dysmenorrhea is usually associated with the respone of body to prostaglandins and other hormones. Women who experience severe dysmenorrhea may have a higher sensitivity to hormonal fluctuations. This sensitivity or imbalance may contribute to more severe symptoms of HG. The elevated hormone levels, particularly human chorionic gonadotropin (hCG) and estrogen, are known to be linked to HG. So, women who are more sensitive to hormonal changes and have a history of dysmenorrhea are more likely to experience severe symptoms of HG[21].

In the present investigation, two patients (6.25%) in the severe group and eighteen patients (20.45%) in the moderate group were passive smokers (passive smoking is the involuntary inhaling of smoke from cigarettes or other tobacco products used by others). Smoking was insignificantly different between severe and moderate groups. Thakur *et al*., (2019) reported that 123 (84.72 %) patients were non-smokers while 21 (14.58 %)

were passive smokers (20). Kim *et al*.,(2020) shown that smoking patients had a decreased incidence of HG-related hospital stays[8].

Louik *et al*.,(2006) discovered that pregnant smokers had a lower admission rate for HG than non-smoking women. It could be because smoking has a negative impact on placental function[22].

Zhang and Cai (1991) discovered that maternal vomiting in Taiwanese women was twice as likely to occur when their father smoked[23]. The fact that we were unable to gauge the incidence of paternal smoking in our research, however, may have introduced confounding variables that affected the outcome. The fact that smoking was far less common in our research sample than it was in previous studies might perhaps be the cause. Thus, research in a community where smoking is more common is required to elucidate the connection between smoking and HG.

In the current study, 4 (4.55%) patients in the moderate group and 12 (37.5%) patients in the severe group had a family history of HG. The severe group had a considerably greater family history of HG than the moderate group (*P value*<0.05). Accordingly, Thakur *et al*. (2019) discovered that 28 percent of patients had a mother's and 19 percent of a sister's family record of hyperemesis[20].

Hospital stay ranged from 7 to 14 days with a mean value 9.09 ±2.13 days in severe group and ranged from 2 to 5 days with a mean value 3.14 ±1.14 days in moderate group. hospital stay was significantly prolonged in severe group than moderate group (*P-value*<0.05). Termination of pregnancy occurred in 1 (3.13%) patient in severe group and in 0 (0%) patients in moderate group. Termination of pregnancy was insignificantly different between both groups (*P value*>0.05). Termination of pregnancy was done because of persistent vomiting not responding to treatment after 2 weeks of treatment with impairment of liver function, persistently rising liver enzymes.

In the current study, the severe group had considerably lower pH, HCO3, and PaCO2 than the moderate group (*P value*<0.001). The severe group had considerably greater SGPT, SGOT, and ketonuria than the moderate group (*P value*<0.001). There was no discernible difference in serum creatinine levels between the moderate and severe groups.

CONCLUSION

In conclusion, we found that past history of HG, younger age, lower gravidity, nulliparity, lower body mass index (BMI) and the presence of dysmenorrhea were associated with severe HG. These results imply that maternal characteristics influence how severe HG is.

Limitations of the current study are, firstly, maternal factors that are determined during preparation of methodology of this study and there may be other factors not included in our study, secondly, The fact that the current investigation was limited to a single site may have limited the applicability of our findings to different populations or environments. Future studies involving multiple centers and diverse populations would enhance the external validity of the results. Additionally, recall bias and social desirability bias are potential limitations inherent to self-reported data.

CONFLICT OF INTERESTS

There are no conflicts of interest.

REFERENCES

1. Jennings LK, Mahdy H. Hyperemesis Gravidarum. StatPearls. Treasure Island (FL) ineligible companies. Disclosure: Heba Mahdy declares no relevant financial relationships with ineligible companies.: StatPearls Publishing Copyright © 2023, StatPearls Publishing LLC.; 2023.

2. Bailit JL. Hyperemesis gravidarium: Epidemiologic findings from a large cohort. Am J Obstet Gynecol. 2005;193(3 Pt 1):811-4.

3. Einarson TR, Piwko C, Koren G. Quantifying the global rates of nausea and vomiting of pregnancy: a meta analysis. J Popul Ther Clin Pharmacol. 2013;20(2):e171-83.

4. Tsakiridis I, Mamopoulos A, Athanasiadis A, Dagklis T. The management of nausea and vomiting of pregnancy: synthesis of national guidelines. Obstetrical & Gynecological Survey. 2019;74(3):161-9.

5. London V, Grube S, Sherer DM, Abulafia O. Hyperemesis Gravidarum: A Review of Recent Literature. Pharmacology. 2017;100(3-4):161-71.

6. Oruç AS, Mert I, Akturk M, Aslan E, Polat B, Buyukkagnıcı U, *et al*. Ghrelin and motilin levels in hyperemesis gravidarum. Archives of gynecology and obstetrics. 2013;287:1087-92.

7. Goodwin TM, Montoro M, Mestman JH, Pekary AE, Hershman JM. The role of chorionic gonadotropin in transient hyperthyroidism of hyperemesis gravidarum. J Clin Endocrinol Metab. 1992;75(5):1333-7.

8. Kim HY, Cho GJ, Kim SY, Lee KM, Ahn KH, Han SW, *et al*. Pre-Pregnancy Risk Factors for Severe Hyperemesis Gravidarum: Korean Population Based Cohort Study. Life (Basel). 2020;11(1).

9. Choi HJ, Bae YJ, Choi JS, Ahn HK, An HS, Hong DS, *et al*. Evaluation of nausea and vomiting in pregnancy using the Pregnancy-Unique Quantification of Emesis and Nausea scale in Korea. Obstet Gynecol Sci. 2018;61(1):30-7.

10. Topalahmetoğlu Y, Altay MM, Akdağ Cırık D, Tohma YA, Çolak E, Çoşkun B, *et al*. Depression and anxiety disorder in hyperemesis gravidarum: A prospective case-control study. Turk J Obstet Gynecol. 2017;14(4):214-9.

11. Aksoy H, Aksoy Ü, Karadağ Öİ, Hacimusalar Y, Açmaz G, Aykut G, *et al*. Depression levels in patients with hyperemesis gravidarum: a prospective case–control study. SpringerPlus. 2015;4(1):34.

12. Mitchell-Jones N, Gallos I, Farren J, Tobias A, Bottomley C, Bourne T. Psychological morbidity associated with hyperemesis gravidarum; a systematic review and meta-analysis. BJOG: An International Journal of Obstetrics & Gynaecology. 2016;124.

13. Fejzo MS, Ingles SA, Wilson M, Wang W, MacGibbon K, Romero R, *et al*. High prevalence of severe nausea and vomiting of pregnancy and hyperemesis gravidarum among relatives of affected individuals. European Journal of Obstetrics & Gynecology and Reproductive Biology. 2008;141(1):13-7.

14. Abramowitz A, Miller ES, Wisner KL. Treatment options for hyperemesis gravidarum. Archives of women's mental health. 2017;20:363-72.

15. Lee NM, Saha S. Nausea and vomiting of pregnancy. Gastroenterology Clinics. 2011;40(2):309-34.

16. Chhetry M, Thakur A, Uprety DK, Basnet P, Joshi R. HYPEREMESIS GRAVIDARUM IN A TERTIARY CARE CENTRE IN EASTERN NEPAL: A PROSPECTIVE OBSERVATIONAL STUDY. J Ayub Med Coll Abbottabad. 2016;28(1):18-21.

17. Nurmi M, Rautava P, Gissler M, Vahlberg T, Polo-Kantola P. Incidence and risk factors of hyperemesis gravidarum: A national register-based study in Finland, 2005-2017. Acta Obstet Gynecol Scand. 2020;99(8):1003-13.

18. Fiaschi L, Nelson-Piercy C, Tata LJ. Hospital admission for hyperemesis gravidarum: a nationwide study of occurrence, reoccurrence and risk factors among 8.2 million pregnancies. Hum Reprod. 2016;31(8):1675-84.

19. Nurfadillah W, Rosyidah R, Rinata E, Purwanti Y. Risk Factor of hyperemesis gravidarum incidence. JNKI (Jurnal Ners dan Kebidanan Indonesia) (Indonesian Journal of Nursing and Midwifery). 2023;11(2):116-26.

20. Thakur M, Gautam J, Dangal G. Severity of Hyperemesis Gravidarum and Associated Maternal factors. J Nepal Health Res Counc. 2019;17(3):293-6.

21. Enakpene CA, Dalloul M, Petterkin-Caldwell C, Anopa J, Muneyyirci-Delale O. Dysmenorrhea as a risk factor for hyperemesis gravidarum. Journal of Clinical Gynecology and Obstetrics. 2015;4(4):283-9.

22. Louik C, Hernandez-Diaz S, Werler MM, Mitchell AA. Nausea and vomiting in pregnancy: maternal characteristics and risk factors. Paediatr Perinat Epidemiol. 2006;20(4):270-8.

23. Zhang J, Cai WW. Severe vomiting during pregnancy: antenatal correlates and fetal outcomes. Epidemiology. 1991;2(6):454-7.